



Australian Bureau of Statistics

1504.0 - Methodological News, Mar 2003

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DACMU

The Data Access and Confidentiality Methodology Unit (DACMU) has been set up in Statistical Services Branch. Its aim is to provide a focus for ABS work on confidentiality and has primary responsibility for methodological advice and development.

Data access and confidentiality, particularly for unit record data, has been a major issue for ABS over the last 18 months, culminating in the development of the Remote Access Data Laboratory (RADL) and changes to the administrative arrangements for allowing individuals access to unit record data. The October 2002 Management Meeting recognised that other aspects of confidentiality needed development and one of the groups in the ABS Leadership Program recommended the creation of a focus for ABS work on confidentiality. DACMU is the result of these deliberations.

DACMU will cover the areas of:

- access to microdata (e.g. ways of safely accessing unit record data through RADL);
- confidentiality for microdata (e.g. developing more automated methods of confidentialising data);
- confidentiality for tables (e.g. techniques for consequential suppression of cells); and
- confidentiality for data cubes.

There are many other groups in ABS which are active in the policy, development and operational aspects of data access and confidentiality and, in the main, these groups will continue their activities. A Data Access and Confidentiality Strategy Board (DACSBS), consisting of senior managers, is being set up to guide policy development, identify emerging strategic issues and advise on the work program for DACMU. Division Heads Meetings would decide on policy.

DACMU's roles are to:

- stay informed on developments in the area, including international developments;
- develop and assess methodology for confidentiality and data access;
- specify computing tools and procedures to implement the methodology;
- promote and advise on the application of the methodology;
- develop and provide training;
- coordinate and contribute to the development and review of policy;
- assess proposals for micro data release; and
- provide secretariat services to DACSBS and MDRP.

The short to medium term priorities are:

- set up the DACSBS;
- make Confidentialised Unit Record File development and assessment process quicker and earlier (by greater automation and improved processes);
- continue to assess proposals for release of microdata on CD-ROM, via RADL and from on site data labs;
- develop methodology and policy on confidentiality for datacubes;
- use existing tools and methods to reduce highly inefficient confidentialising of tables;
- market DACMU and new policy on access to microdata;
- build up expertise in data access and confidentiality issues; and
- confidentiality for geocoded data.

As part of its role in methodology and policy, DACMU will maintain an issues register, respond to adhoc queries and keep a list of Frequently Asked Questions. Any queries or issues should be directed to Bill Gross (Director) and Kirsty Leslie in Central Office and Phil Bell in South Australia.

For more information, please contact Bill Gross on (02) 6252 7306.

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ANALYTICAL SKILLS FOR ABS STAFF

In January 2001, the **Statistical Skills for ABS Staff** booklet was launched. It encapsulates thinking about the skills needed by those who work on the national statistical system, clustered under such themes as statistical leadership, research and development, analysis, data collection, data processing and dissemination. It has been very influential in shaping ABS training programs and in providing guidance to our staff about their professional development. Among other things, **Statistical Skills** includes a high-level view of the analytical competencies needed by our staff. During the past year, there has been considerable thinking about the kinds of analysis that are undertaken at different stages of the statistical cycle, the analytical skills needed by staff in our various organisational units, and ways of enhancing our analytical capacity. Much of this thinking has been inspired by the Business Statistics Innovation Program, which is overhauling the ABS approach to economic statistics, but similar issues arise in social, environmental and other statistics.

Work is afoot to spell out in greater detail the analytical competencies needed for ABS work. This embraces:

- **Knowledge.** The economic, social and environmental conceptual frameworks that inform and underlie analysis; key views of data; themes and variations in the analyses done by policy agencies, researchers and other users.
- **Understanding.** Strategies for undertaking an analytical project; interactions between the question at hand, the dataset and the analytical technique; pitfalls in analysis; quality of analysis - defining quality, assuring quality and making quality visible.
- **Skills.** Assembling a suitable dataset; choosing an analytical technique that is appropriate to the question and the datasets at hand; communicating the story told by the analysis to diverse groups of users.

A rough draft has been prepared and during the next couple of months progressively refined drafts will be vetted by interested parties. The material will be integrated with the *Statistical Skills* booklet (probably in e-document form) during the first half of 2003.

For more information, please contact Ken Tallis on (02) 6252 7290.

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TARGETED INTENSIVE FOLLOW-UP

An important stage of the survey cycle is the process of Intensive Follow Up (IFU) in which concerted effort is made to increase response rates to ensure high quality estimates. While all ABS surveys strive to reach high response rates, the processes chosen to achieve this may vary considerably from survey to survey.

The ABS has developed a general framework for targeting IFU which was presented at the International Conference on Establishment Surveys II in Buffalo, New York, USA in 2000. Since then we have worked on refining the framework and testing the methodology.

The general method for targeting IFU is to rank non-respondents in term of importance. The technique for ordering may take several forms. As a group, these methods are referred to in the ABS as 'targeted IFU'. The recent work focused on three levels of targeted IFU, each with increasing requirements and corresponding opportunities for gains in quality of survey estimates. The three targeted IFU levels reflect both the changing types of auxiliary information available and increasing quality requirements of the survey.

Level I: Aims to examine key elements to the survey data quality to ensure that the providers responding at final close-off provide a balanced, representative sample that matches the sample design as closely as possible in order to minimise the non-response bias of the survey. Level I is the most general type of targeted IFU and can be applied to any business survey (one-off, irregular or regular) and is likely to be used for the majority of irregular and newly implemented surveys. Non-responding providers are prioritised based on stratum level information, with all providers within a stratum receiving the same score, (based on such things as newon status, weight and proportion of defunct/nils in the strata).

Level II: Is a more accurate IFU process, which augments Level I IFU by using available auxiliary information. In contrast to Level I, Level II may give a different score to non-responding providers within the same stratum, as the auxiliary information may be at the individual provider level. Level II is particularly suited for ongoing surveys, where previous data for providers is available, or where other related data can be sourced. Examples of auxiliary data include difficulty to impute (based on previous provider response); related data reported in ABS survey with common providers; long-term non-response; and historical contribution to estimates.

Level III: Level III IFU is a different process to the other types. It centres on calculating the error of imputation for non-responding providers for all key data items. The error of imputation is the absolute difference between the providers actual data and imputed data, relative to the level estimate for the cycle they last responded. Level III produces a score based entirely on historical data for the provider. (Where historical provider-level data is unavailable, providers are given a maximum score). The error of imputation is calculated at the class of interest (for example, one-digit industry) and is standardised against a set of benchmarks to produce the unit's score. When the criteria for implementation are met, Level III IFU can make provider-level inferences about the influence and reliability of any given provider's response in the context of the overall estimates. High cost is a limiting factor for Level III, both to cover the initial investigation prior to implementation and maintenance. Complex imputation methodologies can complicate its evaluation and implementation. Each level has increasing requirements for implementation, from general applicability through to more rigid requirements of survey data stability and large sample. It is expected that each survey would use the level best suited to that survey. For ongoing surveys, any initial technique implemented could be evaluated later as more information and/or additional data sources were made available. An evaluation should also measure whether the IFU method is achieving its objectives (ie improve quality, reduce costs, etc).

Based on the evaluations conducted in Western Australia on the Labour collections and the development of a three tier framework we have proposed that:

- the targeted IFU framework be used for describing IFU processes and practices undertaken within business surveys in the ABS;
- we work through how the technique could be used in practice to meet the requirements of different surveys; and
- we test how the scoring methods reflecting the frameworks principles can be applied in practice to other collections.

The results so far have been positive and it is expected that the introduction of targeted IFU techniques to survey areas which currently have none will allow an improved allocation of resources for IFU, and provide a framework for decision making regarding costs associated with IFU processes. It is also expected that the use of a targeted IFU technique will result in gains in estimate quality as the responding sample more closely aligns with the sample design.

For further information, please contact Paul Sutcliffe on (02) 6252 6759.

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A "PRACTICE MANUAL" FOR SMALL AREA ESTIMATION

The ABS, like other national statistical agencies, is facing increasing demands for estimates on smaller domains (smaller geographic areas, subpopulations, subindustries, finer time periods) than are supported by our surveys. Spread across the ABS is a good deal of experience with small area estimation based on a variety of techniques - ranging from simple prorating through to state-of-the-art Markov Chain Monte Carlo Bayesian methods, multilevel modelling and the like.

The Analysis Board recently commissioned a project that will distil the literature and the experience of statistical agencies into a "practice manual" that will provide guidance on such matters as:

- the classes of problems and datasets to which small area estimation can be applied;
- the spectrum of available methods;
- the circumstances in which each method might be most suitable for application in a statistical agency (including when a simple method might yield results almost as usable as a complex method);
- when explicit small area estimates might not be needed - and when the client's needs might be satisfied just as well by, say, a compendium of large area measures and small area indicators;
- how to define and assure the quality of small area estimates, and how to explain their quality and limitations to users; and
- where to find examples of each method and where to get help if you have been asked to develop small area estimates.

Although the aim is to provide a roadmap of good practice (rather than to generate estimates addressing a particular statistical need), one or more demonstration projects may spin off from our work on the practice manual.

The project will be overseen by a board of economic and social statisticians and methodologists. Draft segments of the manual will be issued progressively during 2003.

For more information, please contact Ken Tallis on (02) 6252 7290.

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BUSINESS PROVISIONS POST STREAM 2

The Business Provisions are the mechanism through which survey estimates are adjusted to allow for population changes (births, deaths and resurrections) that occur between when survey frames are taken (from the common frame) and the reference period to which the survey frame is applied. Frame changes associated with the implementation of Tax Reform Stream 2 have led to substantial changes to the Business Provisions methodology.

Prior to Stream 2 implementation, the Business Provisions consisted of three broad components:

- the after frame extraction population (AFE) component;
- the outstanding population component (businesses yet to be processed to the Business Frame); and
- an adjustment for Tax Reform Stream 1.

The pre-Stream 2 Business Register was maintained by the ABS but with population changes processed by ABS staff. Inscope population changes processed after frame extraction and before the end of the reference period were included in the AFE component while those population changes still unprocessed at the end of the reference period were included in the outstanding population component. For the period spanning June 2001 - June 2002, further adjustments were included to mitigate the effect of the Tax Reform Stream 1 changes to the Business Frame.

The implementation of Stream 2 has greatly simplified the methodology for calculating Business Provisions counts. These counts represent changes since the survey frame was created to the end of the reference period. In preparing the Business Frame for Stream 2 migration, the entire outstanding population was loaded to the ABS Business Register. Coupled with a move to direct loading and more timely information from the Australian Taxation Office (ATO), this has led to the complete removal of the outstanding population. Consequently, there is no longer any need to include the outstanding population component in the Business Provisions. The implementation of Stream 2 also called for the complete removal of the Stream 1 adjustments.

Furthermore, the implementation of Tax Reform Stream 2 has simplified the calculation of the AFE component. With more timely information from the ATO, a deathing adjustment that was previously included, is no longer necessary and the Stream 2 modification to the proxy rule has led to a simplification of the birth-death pair adjustment.

In conjunction with the Common Frames Unit in the Integration Branch (Statistical Services Branch) has recently re-engineered the Business Provisions system to incorporate the simplified methodology, be more user-friendly and still produce the output required for the generalised estimation system. The new Business Provisions methodology and system is now in production and has been used to produce the September quarter Business Provisions estimates for subannual surveys and the 2001-2002 estimates for annual surveys.

Response to the new methodology and programs has been positive with the July 2002 Business Provisions contribution to the Australia level Retail Turnover Estimate being 1.02%, a drop from 2.21% in June 2002. A similar drop in the contribution by to estimates has also been seen in the Average Weekly Earnings and Job Vacancies Surveys.

In response to the Business Survey Innovation Program, future support for Business Provisions will be provided by the Victorian Methodology Unit.

For further information, please contact Dale Wallace on (02) 6252 7313.

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ESTIMATING THE INPUT-OUTPUT BASED INDUSTRY MULTIFACTOR PRODUCTIVITY

The ABS publishes a variety of productivity measures in the **Australian System of National Accounts** (ASNA, Cat. No. 5204.0). The most comprehensive measure at present is the index of multifactor productivity (MFP) for the market sector of the economy. This aggregate MFP index is a ratio of the index of real gross domestic product over the index of combined capital and labour inputs in the market sector. In this context, the "market sector" excludes Property and business services, Government administration and defence, Education, Health and community services and Personal and other services, owing to the difficulty of estimating real output for those industries. The growth of this MFP index reflects productivity and technical change in the market sector as a whole.

There is, however, an ongoing, strong user demand for the MFP estimates dissected by industry, which the ABS is not yet able to meet. At present, users must either compile their own MFP measures, or rely on the labour productivity measure in ASNA, which is a partial measure of productivity and unsatisfactory in a number of ways. To fill this gap, Analysis Branch, in consultation with the National Accounts Branch, has initiated a project to estimate the industry MFP growth using the input-output (I/O) based approach. The project initiation has taken account of several improvements made recently in the measurement of inputs and outputs, as well as the integration of supply and use tables in both current prices and in the prices of the previous year and the national accounts.

The methodology of estimating industry MFP growth based on the I/O framework has been developed and adopted by Statistics Canada for its productivity accounts. It provides a unified framework under which the aggregate as well as the industry MFP growth can be derived. Under this methodology, several classes of industry MFP measure can be estimated simultaneously. These classes of industry MFP measure capture the different levels of productivity growth by industry as a result of various degrees of interconnection among the industries. Thus the estimates can generate new interpretations and insights to enrich our understanding of productivity dynamics of different industries in the economy.

The recent debate on the role of information and communications technology (ICT) played in the productivity surge since the second half of the 1990s seems to largely focus on the results from the studies using aggregate productivity measures. Since different measures of MFP growth at the industry level can be derived under the I/O based methodology, it is appropriate to use in the estimation of productivity growth and spill-over effects among industries in which the impact of ICT is typically observed. This methodology may also be useful to investigate the issues of whether use or production of ICT is the main driver of the recent productivity surge.

To apply this methodology to the Australian MFP estimation requires much research effort to understand the methodology and the data issues that are unique to Australia. Thus the project has been planned to consist of several stages. At the first stage, we have focussed on the conceptual and theoretical aspects of the I/O based MFP methodology to reach a good understanding of the relationships between this and other methodologies of estimating MFP growth in economics literature. Based on this understanding, the second stage of the project concentrates on empirical work, where the methodology is applied to estimate the indices of industry MFP growth for the market sector using the 1996/97 and 1997/98 supply and use tables and other relevant data. Currently, we are in the middle of this stage.

As the quality and plausibility of the results are dependent on the quality of the I/O tables and other data provided, we have been working very closely with the Input-Output Section, and Capital, Production and Deflator Section of the National Accounts Branch.

The second stage is also very critical for our project, because the results generated from the work will largely determine the feasibility of a full-scale implementation of the methodology in the final stage of the project. Currently, our pilot study has produced some preliminary results and they are undergoing various diagnostics and validation work.

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